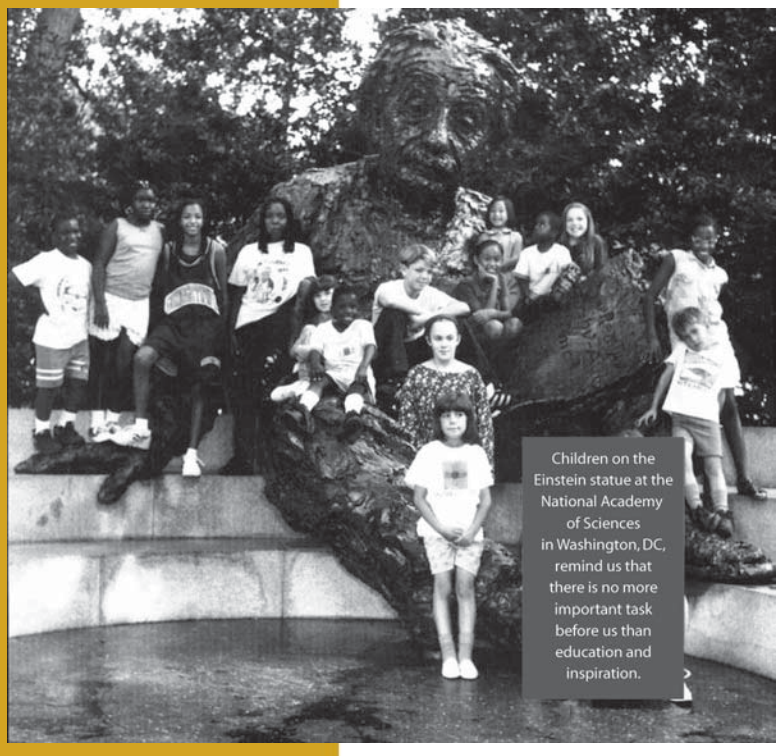
Preface

At the beginning of time, the Universe was formless energy. This energy transformed into the richly complex matter of which we and all we touch are made. The Structure and Evolution of the Universe (SEU) theme within NASA's Office of Space Science seeks to explore and understand the dynamic transformations of energy in the Universe—the entire web of biological and physical interactions that determine the evolution of our cosmic habitat. This search for understanding will enrich the human spirit and inspire a new generation of explorers, scientists, and engineers.

This roadmap is about the future of the SEU theme. Many science objectives encompassed by the SEU theme have been given high priority by the science community through working groups, roadmap teams, and strategic planning processes. This roadmap draws upon broad community input, including the specific recommendations of recent consensus reports of the National Academy of Sciences such as *Astronomy and Astrophysics in the New Millennium* (2001) and *Connecting Quarks with the Cosmos* (2002).

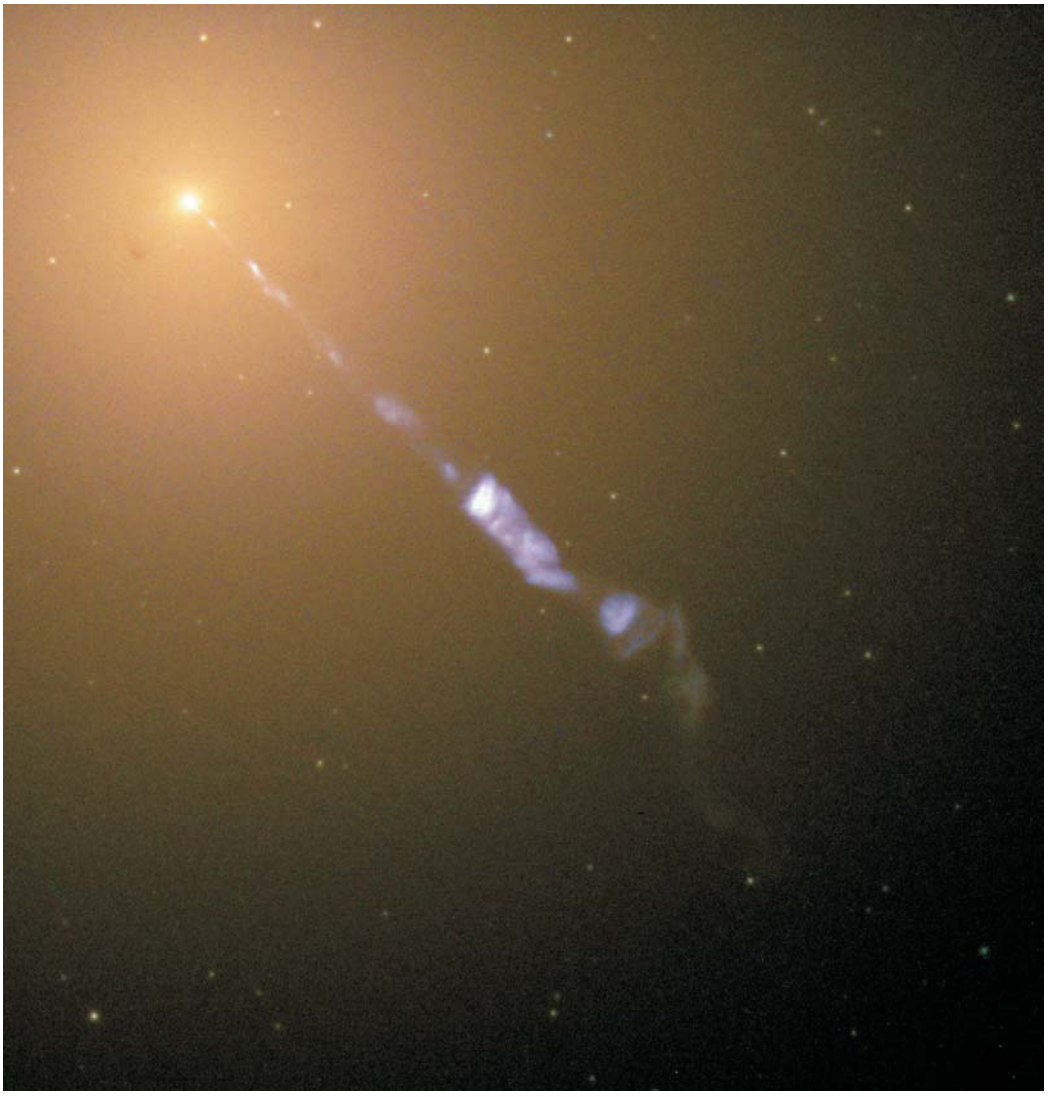
Many of the community's science priorities could be realized within the next 25 years. This roadmap recognizes that, within the resources available, not all of these science objectives can be undertaken immediately. Constructing a roadmap clearly entails making hard choices.

In this roadmap, the science objectives for SEU are presented and prioritized. The research programs and space missions required to address the science objectives are identified. The roadmap lays out a path that begins at the completion of the present program and leads to the future.



Children on the Einstein statue at the National Academy of Sciences in Washington, DC, remind us that there is no more important task before us than education and inspiration.

The SEU theme's highest priorities are presented in the Beyond Einstein program (Part I). A roadmap is presented for realizing these objectives starting now. The science objectives described in the Cycles of Matter and Energy program (Part II) are presented with the understanding that this program will be undertaken after Beyond Einstein has begun. Part III details continuing activities vital to maintaining the technical base to implement these missions and develop future ones.



Hubble Space Telescope image of the jet of plasma moving at relativistic speed away from the supermassive black hole at the center of the nearby galaxy Messier 87.